

the species. A basic tenet of CALFED's implementation of ecosystem-based management is, to the extent feasible, to restore or rehabilitate the natural processes that create and maintain the important elements of ecosystem structure. Ecosystem-based management differs fundamentally from the more traditional approach of species-based management, which seeks to manipulate specific environmental factors (e.g., direct removal of predators from the environment to reduce predation levels on the target species) thought to be limiting target species populations at levels below management objectives.

ECOSYSTEM ELEMENT: An ecosystem element is a basic component or function which, when combined with other ecosystem elements, make up an ecosystem. An ecosystem element can be categorized as a process, habitat, species, species community, or stressor.

ECOSYSTEM REHABILITATION: Within CALFED's concept of ecosystem restoration, the ERP will largely focus on ecosystem rehabilitation. In the context of CALFED, ecosystem rehabilitation is defined as the process by which resource managers reestablish or refurbish key elements of ecological structure and function within the Bay-Delta ecosystem to a level necessary to achieve ERP goals and objectives.

ECOSYSTEM RESTORATION: Ecosystem restoration is a term sometimes used to imply the process of recreating the structural and functional configurations of an ecosystem to that present at some agreed to time in the past. Because the structure and function of many elements of the Bay-Delta ecosystem have been severely disrupted and cannot be feasibly restored to a specified historic condition, within the context of CALFED, ecosystem restoration is more realistically defined as the process by which resource managers ensure that the capacity of the ecosystem to provide ecological outcomes valued by society is maintained, enhanced, or restored.

ECOLOGICAL PROCESS: Ecological processes act directly, indirectly, or in combination, to shape and form the ecosystem. These include streamflow, stream channel, and floodplain

processes. Stream channel processes include stream meander, gravel recruitment and transport, water temperature, and hydraulic conditions. Floodplain processes include overbank flooding and sediment retention and deposition.

HABITATS: Habitats are areas that provide specific conditions necessary to support plant, fish, and wildlife communities. Some important habitats include gravel bars and riffles for salmon spawning, winter seasonal floodplains that support juvenile fish and waterbirds, and shallow near-shore aquatic habitat shaded by overhanging tule marsh and riparian forest.

LONG- AND SHORT-TERM OBJECTIVES:

Objectives can be both short-term and long-term. Short-term objectives should be clearly feasible, relatively easy to measure, and achievable in reasonable length of time (usually less than 25 years). The time period is not the same as Stage I of the CALFED process. Long-term objectives may be more difficult to determine and require additional resources and knowledge to achieve. (Note: these differ from Strategic Objectives which are defined later in this section.)

PROGRAMMATIC ACTION: A programmatic action represents a physical, operational, legal, or institutional change or alternative means to achieve a target. The number of actions and their level of implementation is subject to adjustment by adaptive management. For example, the number of diversions screened may be adjusted up or down depending on the overall response of fish populations to screening and other restoration actions.

An example of a programmatic action is to develop a cooperative program to acquire and restore 1,500 acres of tidal perennial aquatic habitat in the Suisun Bay and Marsh Ecological Management Unit.

SPECIES DESIGNATION: The classification system used to organize species by status. The species designations used in the ERP for species evaluated in the MSCS are identical to the designations used in the MSCS (recover, contribute to recovery, and maintain), and

include additional designations for species or biotic communities not addressed in the MSCS. The two additional ERP designation include enhance and/or conserve native biotic communities, and maintain and/or enhance harvested species. The species designated for recovery, contribute to recovery, maintain, and enhance and/or conserve native biotic are addressed by Strategic Goal 1. Species designated as maintain and/or enhance harvested species are addressed by Strategic Goal 3 (maintain and/or enhance populations of selected species for sustainable commercial and recreational harvest consistent with the other ERP strategic goals).

SPECIES GOAL: Goals recommended by the Multi-Species Conservation Strategy Team for evaluated species. The MSCS species goals include recover, contribute to recovery, and maintain. The analogous ERP terms are found in the Strategic Objective for Strategic Goal 1 which addresses at-risk species.

SPECIES GOAL PRESCRIPTIONS: A performance standard to measure progress toward the species goal by providing habitat or population targets. (Note: Species Goal Prescriptions originate from the MSCS. The ERP equivalent is species target. For species designated as recover, contribute to recovery, or maintain, the ERP species target is identical to the MSCS species goal prescription. For species not evaluated in the MSCS, the ERP species target is the performance standard to measure progress toward the objective.)

SPECIES AND SPECIES GROUPS: Certain species or groups of species are given particular attention in the ERP. This focus is based on three criteria that might be met by a species (including fish, wildlife, and plants): 1) is it a formally listed threatened or endangered species (e.g., winter-run chinook salmon, delta smelt), or is it a species proposed for listing; 2) it is economically important, supporting a sport or commercial fishery (e.g., striped bass, signal crayfish); 3) is it a native species or species community that is presently not listed by which could be if population abundance or distribution declines, or 4) it is an important prey species (e.g., Pacific herring).

STAGE 1 EXPECTATIONS: Stage 1 expectations are meant to be measures of the progress towards meeting short-term objectives in the first 7 years of implementation program. These expectations have two basic components: improvements in information to allow better management of the ecosystem and improvements in physical and biological properties of the Bay-Delta ecosystem and watershed.

STRATEGIC GOAL: Strategic goals are the broad statements that define the scope and purposes of the ERP. Strategic goals provide guidance in structuring Strategic Objectives, developing targets, and evaluating proposed restoration actions.

The hierarchy for goals, objectives, targets and programmatic actions follows:

- *Strategic Goal*
 - *Strategic Objective*
 - *Target*
 - *Programmatic Action.*

STRATEGIC OBJECTIVES: Strategic Objectives are associated with the Strategic Goals and are intended to assess progress toward achieving the associated goals. Strategic Objectives are fixed and are not expected to change over time. Strategic objectives are a more detailed delineation of the Strategic Goal components and provide a framework to develop and organize targets and programmatic actions. A strategic objective is the most specific and detailed description of what the ERP strives to maintain or achieve for an ecosystem element. The objectives are stated primarily in terms of management actions designed to have a favorable impact on the Bay-Delta system, however, some are also stated in terms of studies that will teach us how the ecosystem behaves so that principles of adaptive management can be better employed. (Note: Strategic Objectives differ from long- and short-term objectives.)

STRESSORS: Stressors are natural and unnatural events or activities that adversely affect ecosystem processes, habitats, and species. Environmental stressors include water diversions,

water contaminants, levee confinement, stream channelization and bank armoring, mining and dredging in streams and estuaries, excessive harvest of fish and wildlife, introduced predator and competitor species, and invasive plants in aquatic and riparian zones. Some major stressors affecting the ecosystem are permanent features on the landscape, such as large dams and reservoirs that block transport of the natural supply of woody debris and sediment in rivers or alter unimpaired flows.

TARGET: A target is a qualitative or quantitative statement of a Strategic Objective. Targets are something to strive for but, unlike Strategic Objectives, may change over the life of the program with new information and progress, or may vary according to the configuration of storage and conveyance in all alternatives. Target adjustments will be science driven and based on the results of adaptive management. Targets may include a range of values or a narrative description of the proposed future value of an ecosystem element. Targets are to be set based upon realistic expectations, must be balanced against other resource needs and must be reasonable, affordable, cost effective, and practicably achievable.

The intent of the ERP is to achieve ecosystem health; targets are flexible tools to guide the effort. The level of implementation for each target will be determined or adjusted through adaptive management. Targets are categorized according to the three levels of certainty described above: (1) targets that have sufficient certainty of success to justify full implementation in accordance with program priorities and staged implementation; (2) targets which will be implemented in stages with the appropriate monitoring and evaluation to judge benefits and successes; and (3) targets for which additional research, demonstration and evaluations are needed to determine feasibility or ecosystem response.

Examples of targets include restoring 2,000 acres of tidal perennial aquatic habitat in the South Delta Ecological Management Unit (quantitative target) and reducing entrainment of juvenile salmon, steelhead, sturgeon, and splittail into

water diversions to levels that will not impair stock rebuilding or species restoration (qualitative target).

VISION: A vision is what the ERP will accomplish with the stated objectives, targets, and programmatic actions for an ecological process, habitat, species or species group, stressor, or geographical unit. The vision statements included in the ERP provide technical background to increase understanding of the ecosystem and its elements. Two types of vision statements are included in the ERP: visions for ecosystem elements (landscape level visions in Volume I) and visions for ecological zones and units (ecological zone level visions in Volume II).

The broad landscape level resource visions address an individual ecological processes, habitat, species or species group, or stressor, while the ecological zone and unit visions address the integration of ecological processes, habitats, species, and stressors within a clearly delineated geographical area. Cumulatively, the visions also provide detailed descriptions of the ecosystem and its elements as they will look and function after restoration is accomplished.

Table 2. Crosswalk of ERP and MSCS Terminology.

ERP Term	MSCS Term	Clarification
Strategic Goal	-----	The MSCS has no equivalent term for strategic goal.
Strategic Objective	Species Goal	The ERP has adopted the MSCS species goals for evaluated species (recover, contribute to recovery, and maintain) which are reflected in three of the objectives for at-risk species. The ERP has two additional species-oriented objectives that include enhancing and conserving biotic communities and maintaining and enhancing harvested species.
Target	Species Goal Prescription	ERP species targets are analogous to the MSCS use of species goal prescriptions for evaluated species. The ERP includes targets for species not evaluated in the MSCS including biotic communities and harvested species. The ERP terminology is "target" for processes, habitats, and stressors and "species target" for species to differentiate from the MSCS use of "species goal prescription" for evaluated species.
Programmatic Action	Conservation Measure	ERP programmatic actions and MSCS conservation measures are closely related but are not synonymous. Programmatic actions are physical, operational, or regulatory activities to improve ecological health while conservation measures provide guidance on the manner in which the programmatic actions are implemented. MSCS conservation measures also provide additional detail to some ERP programmatic actions.

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◆ TARGETS, ACTIONS, AND MEASURES FOR SPECIES AND COMMUNITIES

INTRODUCTION

This section has been revised to clarify and integrate diverse species designations previously described in the Strategic Plan for Ecosystem Restoration, the Ecosystem Restoration Program Plan, and the Multi-Species Conservation Strategy.

STRATEGIC GOALS

Two Strategic Goals are closely related to efforts to restore species in the Bay-Delta system. —

1. Achieve, first, recovery and then large self-sustaining populations of at-risk native species dependent on the Delta and Suisun Bay; support similar recovery of at-risk native species in the Bay-Delta estuary and its watershed; and minimize the need for future endangered species listings by reversing downward population trends of native species that are not listed.
3. Maintain and/or enhance populations of selected species for sustainable commercial and recreational harvest, consistent with the other ERP strategic goals.

SPECIES DESIGNATIONS

The Multi-Species Conservation Strategy (MSCS) addresses all federally and State listed, proposed, and candidate species that may be affected by the CALFED Program; other species identified by CALFED that may be affected by the Program and for which adequate information is available also are addressed in the MSCS. The term "evaluated species" is used to refer to all of the species addressed by the Conservation Strategy. Please refer to the MSCS appendix (Multi-Species Conservation Strategy 1999) for more information and for a complete list of evaluated species.

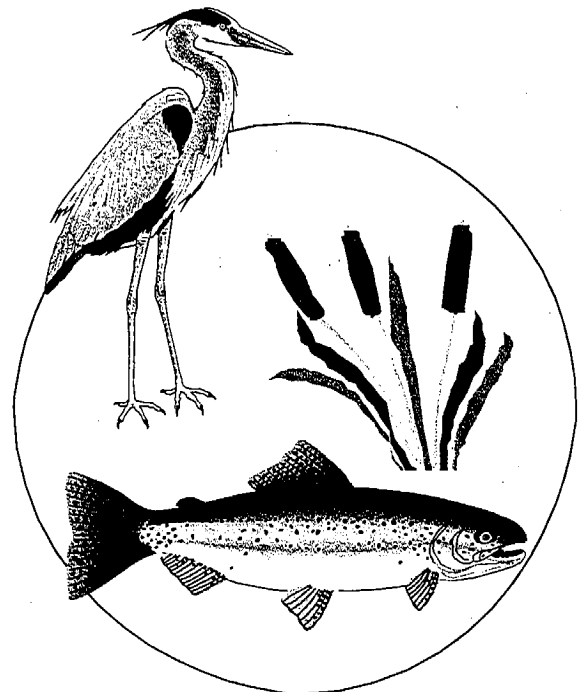
The following is a discussion and definition of each of the five species designations used in the ERP. These designations have evolved during the development of the ERP. The present set of designations differs from designations previously presented in the ERP. Table 3, following the designation descriptions, provides a crosswalk of

previous designations and how they are related to the present designations.

RECOVER

RECOVERY "R": For species designated "R," the CALFED Program has established a goal to recover the species within the CALFED ERP Ecological Management Zones. A goal of "recovery" was assigned to those species whose recovery is dependent on restoration of the Delta and Suisun Bay/Marsh ecosystems and for which CALFED could reasonably be expected to undertake all or most of the actions necessary to recover the species. Recovery is achieved when the decline of a species is arrested or reversed, threats to the species are neutralized, and the species; long-term survival in nature is assured.

Recovery is equivalent, at a minimum, to the requirements of delisting a species under FESA and CESA. Certain species, such as anadromous fish, have threats outside the geographic scope or purview of CALFED (e.g., harvest regulated under the Magnuson-Stevens Act). Therefore, in some instances CALFED may not be able to complete all actions potentially necessary to recover the species; however,



CALFED will implement all necessary recovery actions within the ERP Ecological Management Zones. For other species, CALFED may choose a goal that aims to achieve more than would be required for delisting (e.g., restoration of a species and/or its habitat to a level beyond delisting requirements). The effort required to achieve the goal of "recovery" may be highly variable between species. In sum, a goal of "recovery" implies that CALFED is expected to undertake all actions within the ERP Ecological Management Zones and Program scope necessary to recover the species.

CONTRIBUTE TO RECOVERY

CONTRIBUTE TO RECOVERY ("r"): For species designated "r," the CALFED Program will make specific contributions toward the recovery of the species. The goal "contribute to recovery" was assigned to species for which CALFED actions affect only a limited portion of the species range and/or CALFED actions have limited effects on the species.

To achieve the goal of contributing to a species' recovery, CALFED is expected to undertake some of the actions under its control and within its scope that are necessary to recover the species. When a species has a recovery plan, CALFED may implement both plan measures that are within the CALFED Problem Area, and some measures that are outside the Problem Area. For species without a recovery plan, CALFED will need to implement specific measures that will benefit the species.

MAINTAIN

MAINTAIN ("m"): For species designated "m," the CALFED will undertake actions to maintain the species. This category is less rigorous than "contribute to recovery." The goal "maintain" was assigned to species expected to be minimally affected by CALFED actions. For this category, CALFED will avoid, minimize, and compensate for any adverse effects to the species commensurate with the level of effect on the species. Actions may not actually contribute to the recovery of the species; however, at a minimum, they will be expected to not contribute to the need to list a species or degrade the status of a listed species. CALFED will also, to the extent practicable, improve habitat conditions for these species.

ENHANCE AND/OR CONSERVE BIOTIC COMMUNITIES

ENHANCE AND/OR CONSERVE BIOTIC COMMUNITIES ("E"): For those communities designated "E," the ERP will undertake actions to conserve and enhance their diversity, abundance and distribution in a manner that contributes to their long-term sustainability without adversely affecting efforts to improve conditions for other at-risk species.

MAINTAIN AND/OR ENHANCE HARVESTED SPECIES

MAINTAIN AND/OR ENHANCE HARVESTED SPECIES ("H"): For those species designated "H" the CALFED Program will undertake actions to maintain the species at levels which support or enhance sustainable harvest rates. The goal "maintain harvested species" was generally assigned to species which are harvested for recreational or commercial purposes and which are not already covered under one of the four previous designations. A key to maintaining harvestable surplus levels is to recognize the need to recover, contribute to recovery, or maintain other species. Thus, species interactions such as competition and predation and habitat needs for space and flow need to be balanced in favor of species designated for recovery, contribute to recovery and maintain. Those three designations apply only to native species and assemblages while the "maintain harvested surplus" species include some native species and non-native species. Thus, actions implemented to maintain harvestable surplus would be expected, at a *minimum*, to not contribute to the need to list an unlisted species, degrade the status of an already listed species, or impair in any way efforts to recover, contribute to recovery, or maintain native species.

MSCS CONSERVATION MEASURES

The MSCS defines "conserve, conserving, and conservation" as the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to ESA and CESA are no longer necessary. These methods and procedures include, but are not limited to, all activities associated with scientific resources management, such as research, census, law enforcement, habitat acquisition, restoration and

maintenance, propagation, live trapping and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking (Multi-Species Conservation Strategy 1999).

Two types of conservation measures were developed under the MSCS: 1) measures to avoid, minimize, or compensate for CALFED Program impacts on NCCP communities and evaluated species; and 2) additional measures that ensure the Program meets the species conservation goals. The majority of measures designed to help the Program meet the species conservation goals incorporate and refine existing ERP and other CALFED actions. The scope, location, and timing of a particular CALFED Program action or group of actions, as well as the current status, distribution, and needs of the affected species, will determine which conservation measures would be necessary to compensate for adverse impacts. NCCP habitat conservation measures are primarily directed at conserving the quality and quantity of natural habitats.

Generally, measures to avoid, minimize and compensate adverse effects are addressed early in site-specific project development and are specific

components of the project. The identification of additional measures to ensure that species conservation goals are met are more global in nature and developed to *provide additional detail to ERP programmatic actions*.

An important addition to this version of the ERP is the inclusion of specific conservation measures that provide additional levels of detail to ERP programmatic actions. These conservation measures were designed specifically for MSCS covered species. This version of the ERP displays throughout Volumes I and II where the conservation measures fit in and support existing programmatic actions.

Volume I of the ERP is structured by 1) ecological process, 2) habitat, 3) species, and 4) stressors. Generally, few conservation measures were developed specifically for ecological processes, some habitats and stressors were emphasized in the conservation measures, and most species are directly addressed in one or more conservation measures.

The conservation measures that add detail to ERP programmatic actions are from Attachment 5 of the MSCS.

Table 3. List of Species Comparing Strategic Plan/ERP Classification, MSCS Designation, and Revised ERP Designation.

Species or Biotic Community	Previous Strategic Plan/ERP Classification	MSCS Designation ^{a/}	Revised ERP Designation
Delta smelt	Priority Group I	Recover	Recover
Longfin smelt	Priority Group I	Recover	Recover
Green sturgeon	Priority Group I	Recover	Recover
Sacramento splittail	Priority Group I	Recover	Recover
Winter-run chinook salmon	Priority Group I	Recover	Recover
Spring-run chinook salmon	Priority Group I	Recover	Recover
Central Valley fall-run chinook salmon	Priority Group I	Recover	Recover
Central Valley steelhead	Priority Group I	Recover	Recover
Mason's lilaeopsis	Priority Group II	Recover	Recover
Suisun Marsh aster	Priority Group II	Recover	Recover
Suisun thistle	Priority Group II	Recover	Recover
Soft bird's-beak	Priority Group II	Recover	Recover
Antioch Dunes evening-primrose	Priority Group II	Recover	Recover
Contra Costa wallflower	Priority Group II	Recover	Recover
Lange's metalmark butterfly	Priority Group III	Recover	Recover

Species or Biotic Community	Previous Strategic Plan/ERP Classification	MSCS Designation ^{a/}	Revised ERP Designation
Valley elderberry longhorn beetle	Priority Group II	Recover	Recover
Suisun ornate shrew	Priority Group II	Recover	Recover
Suisun song sparrow	Priority Group II	Recover	Recover
San Pablo song sparrow	New to ERP	Recover	Recover
California clapper rail	Priority Group II	Contribute to Recovery	Contribute to Recovery
California black rail	Priority Group II	Contribute to Recovery	Contribute to Recovery
Swainson's hawk	Priority Group II	Contribute to Recovery	Contribute to Recovery
Salt marsh harvest mouse	Priority Group II	Contribute to Recovery	Contribute to Recovery
San Pablo California vole	Priority Group II	Contribute to Recovery	Contribute to Recovery
Sacramento perch	Priority Group III	Contribute to Recovery	Contribute to Recovery
Riparian brush rabbit	Priority Group III	Contribute to Recovery	Contribute to Recovery
San Joaquin Valley woodrat	Priority Group III	Contribute to Recovery	Contribute to Recovery
Greater sandhill crane	Priority Group III	Contribute to Recovery	Contribute to Recovery
California yellow warbler	Priority Group III	Contribute to Recovery	Contribute to Recovery
Least Bell's vireo	Priority Group III	Contribute to Recovery	Contribute to Recovery
Western yellow-billed cuckoo	Priority Group III	Contribute to Recovery	Contribute to Recovery
Bank swallow	Priority Group III	Contribute to Recovery	Contribute to Recovery
Little willow flycatcher	Priority Group III	Contribute to Recovery	Contribute to Recovery
Giant garter snake	Priority Group III	Contribute to Recovery	Contribute to Recovery
Delta green ground beetle	Priority Group III	Contribute to Recovery	Contribute to Recovery
Saltmarsh common yellowthroat	New to ERP	Contribute to Recovery	Contribute to Recovery
Bristly sedge	Priority Group II	Contribute to Recovery	Contribute to Recovery
Point Reyes bird's-beak	New to ERP	Contribute to Recovery	Contribute to Recovery
Crampton's tuctoria	Priority Group II	Contribute to Recovery	Contribute to Recovery
Delta tule pea	Priority Group II	Contribute to Recovery	Contribute to Recovery
Delta mudwort	Priority Group II	Contribute to Recovery	Contribute to Recovery
Alkali milk-vetch	Priority Group II	Contribute to Recovery	Contribute to Recovery
Delta coyote-thistle	New to ERP	Contribute to Recovery	Contribute to Recovery
Northern California black walnut	Not in ERP	Contribute to Recovery	Contribute to Recovery
Mad-dog skullcap	Priority Group II	Maintain	Maintain
Rose-mallow	Priority Group II	Maintain	Maintain
Eel-grass pondweed	Priority Group II	Maintain	Maintain
Colusa grass	Priority Group II	Maintain	Maintain
Boggs Lake hedge-hyssop	Priority Group II	Maintain	Maintain
Contra Costa goldfields	Priority Group II	Maintain	Maintain
Greene's legenere	Priority Group II	Maintain	Maintain
Recurved larkspur	Priority Group II	Maintain	Maintain
Heartscale	Priority Group II	Maintain	Maintain
California freshwater shrimp	Priority Group III	Maintain	Maintain
Hardhead	Priority Group III	Maintain	Maintain
Western Least bittern	Priority Group III	Maintain	Maintain
California red-legged frog	Priority Group III	Maintain	Maintain
California tiger salamander	Priority Group III	Maintain	Maintain

Species or Biotic Community	Previous Strategic Plan/ERP Classification	MSCS Designation ^{a/}	Revised ERP Designation
Western pond turtle	Priority Group III	Maintain	Maintain
Western spadefoot toad	Priority Group IV	Maintain	Maintain
Lamprey family	Priority Group II	Not Evaluated ^b	Enhance and/or Conserve
Native resident fishes	Priority Group III	Not Evaluated as a group ^c	Enhance and/or Conserve
Native anuran amphibians	Priority Group III	Not Evaluated	Enhance and/or Conserve
Migratory waterfowl	Priority Group IV	Not Evaluated as a group	Enhance and/or Conserve
Shorebird guild	Priority Group IV	Not Evaluated as a group	Enhance and/or Conserve
Wading bird guild	Priority Group IV	Not Evaluated as a group	Enhance and/or Conserve
Neotropical migratory birds	Priority Group IV	Not Evaluated as a group	Enhance and/or Conserve
Planktonic (foodweb) organisms	Priority Group IV	Not Considered ^d	Enhance and/or Conserve
Aquatic habitat plant community	Priority Group IV	NCCP Habitat equivalent ^e	Enhance and/or Conserve
Tidal brackish and freshwater marsh habitat plant community	Priority Group IV	NCCP Habitat equivalent	Enhance and/or Conserve
Seasonal wetland habitat plant community	Priority Group IV	NCCP Habitat equivalent	Enhance and/or Conserve
Inland dune habitat plant community	Priority Group IV	NCCP Habitat equivalent	Enhance and/or Conserve
White sturgeon	Harvestable Species	Not Considered	Maintain Harvest
Striped bass	Harvestable Species	Excluded ^f	Maintain Harvest
American shad	Harvestable Species	Excluded	Maintain Harvest
Non-native warmwater gamefish	Harvestable Species	Excluded	Maintain Harvest
Pacific herring	Harvestable Species	Not Considered	Maintain Harvest
Grass shrimp	Harvestable Species	Not Considered	Maintain Harvest
Signal crayfish	Harvestable Species	Excluded	Maintain Harvest
Upland game	Priority Group IV	Not Considered	Maintain Harvest

Footnotes for Table 3.

- a/: Recover, contribute to recovery, maintain, enhance and/or conserve, and maintain harvest are defined in the text.
- b: Not Evaluated species are species initially considered for inclusion in the MSCS but not evaluated (e.g., Kern brook lamprey, river lamprey, and Pacific lamprey were considered but not evaluated).
- c: Not Evaluated as a Group includes species assemblages described in the ERP but not evaluated as a group in the MSCS. Individual species, however, may have been considered or evaluated (e.g., native resident fishes were not evaluated as a group in the MSCS but Sacramento perch and hardhead were considered and evaluated in the MSCS).
- d: Not Considered species are native species that were screened from consideration by not being on any list of special status species.
- e: NCCP Habitat equivalent denotes an ERP plant community that is analogous to one or more of the 18 NCCP habitats which are broad categories, each of which includes a number of habitat or vegetation types recognized in frequently used habitat classification systems.
- f: Excluded species are non-native organisms not eligible for consideration under the State or federal endangered species acts and thus excluded from consideration or evaluation under the MSCS.